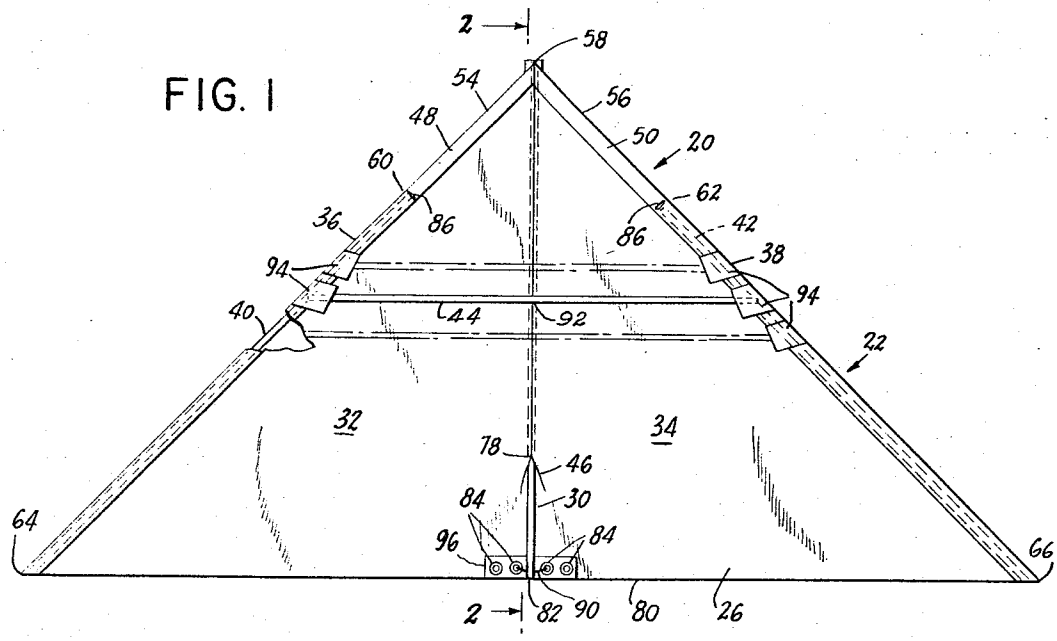
Oct. 17, 1967 A. E. HARTIG 3,347,500

KITE

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FIG. 1



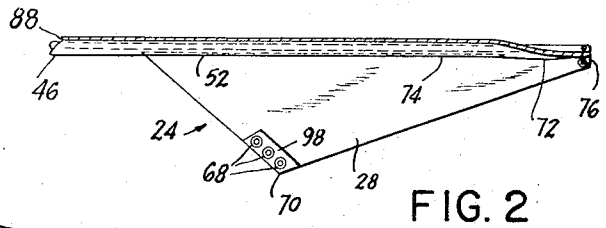


FIG. 2

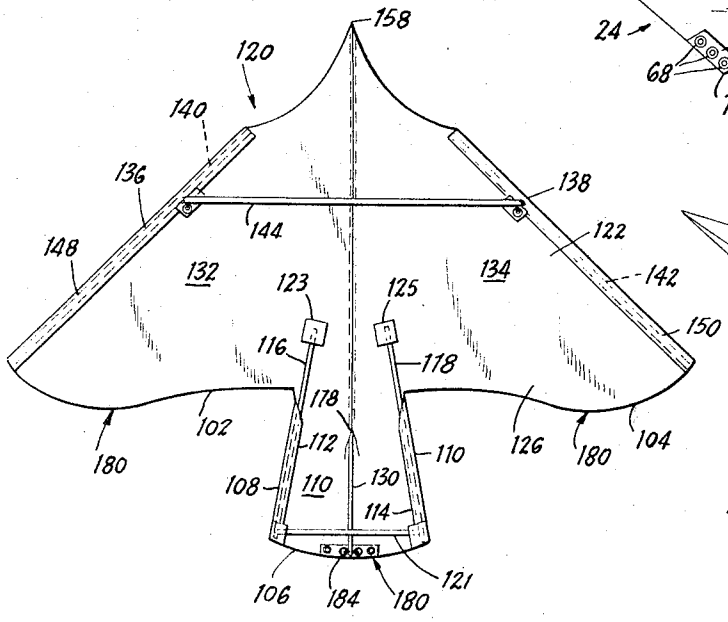


FIG. 4

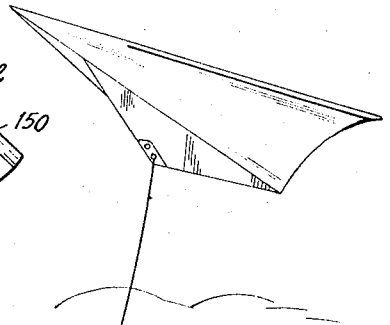


FIG. 3

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KITE

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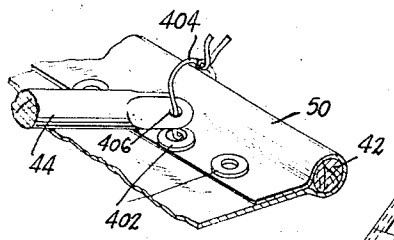


FIG. 7

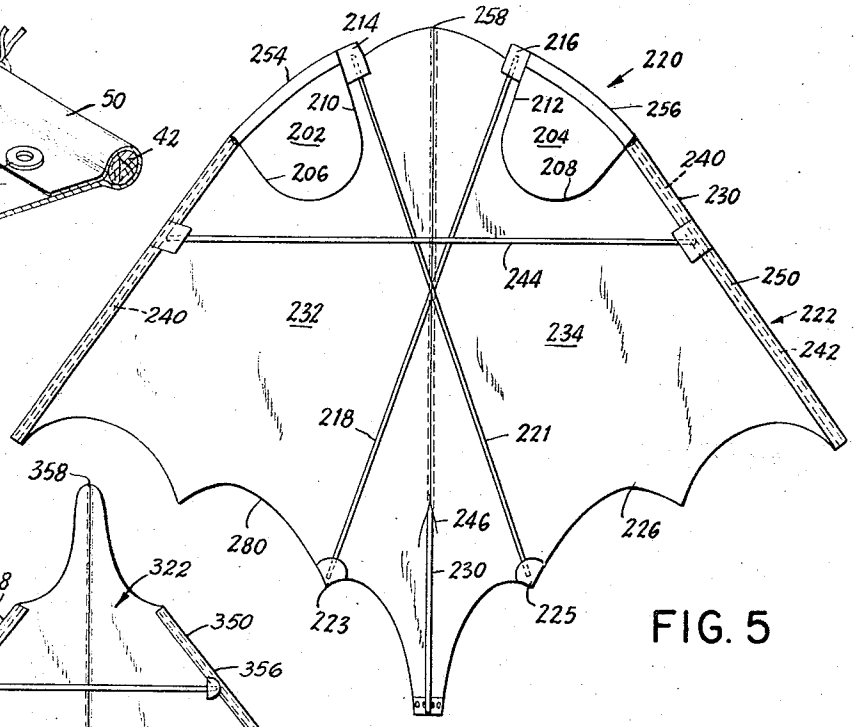


FIG. 5

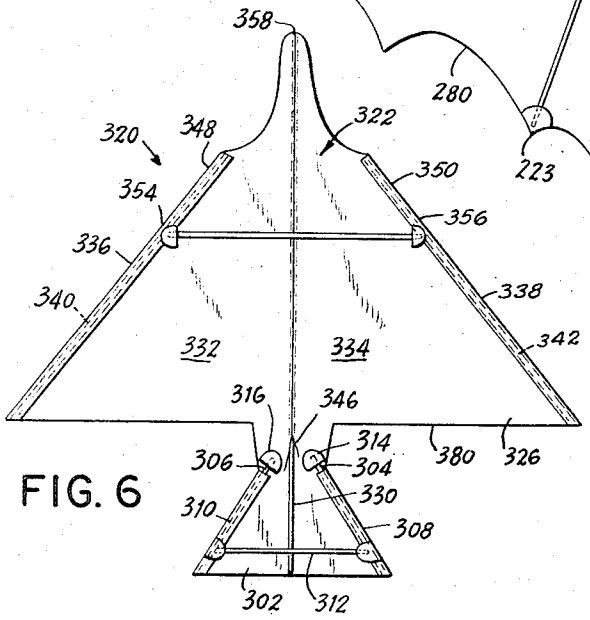


FIG. 6

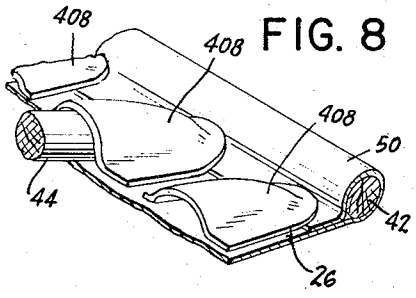


FIG. 8

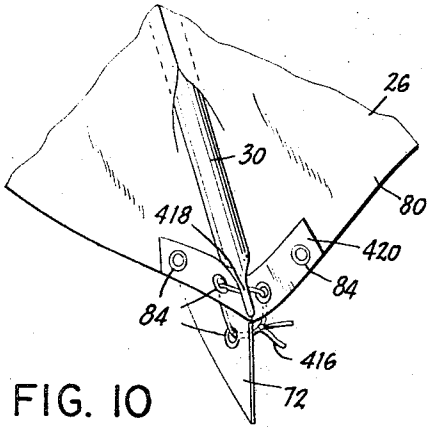


FIG. 10

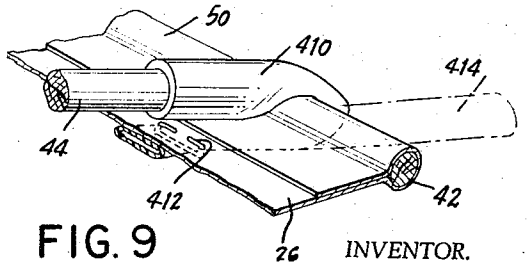


FIG. 9

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United States Patent Office 3,347,500 Patented Oct. 17, 1967

3,347,500

KITE

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Filed June 30, 1966, Ser. No. 561,788
13 Claims. (Cl. 244—154)

ABSTRACT OF THE DISCLOSURE

Kite comprising a main body portion fabricated of flexible material having leading edges diverging generally rearwardly from a forward apex portion, wing strut means extending adjacent the leading edges, wing struts movably positioned within the wing strut sleeves, a center strut sleeve extending generally centrally of the leading edges and terminating forwardly of the rear of the main body portion, center strut means extending within said center strut sleeve, means for securing the rear end portion of the center strut at selected locations adjacent the rear of the main body portion, a keel portion of generally triangular configuration depending from said main body portion generally centrally of the leading edges and provided with a plurality of attachment locations adjacent the lowermost apex thereof for enabling a cord, string, wire or the like to be attached thereto, a portion of the upper edge of the keel portion being free to move relative to the main body portion and adapted to be adjustably positioned relative thereto, a cross strut adapted to be selectively positioned in a plurality of locations transversely of the leading edges.

This invention pertains generally to kites and particularly to that class of kites known as tailless kites.

It is a primary object of the present invention to provide tailless kites having improved take-off characteristics and easier control.

It is a further primary object of the present invention, in addition to the foregoing object, to provide a kite adapted to take off in the slightest wind and with the slightest effort.

It is a further primary object of the present invention, in addition to the foregoing objects, to provide improved kites capable of being launched in very slight winds from a standing position by tossing the kite into the air.

It is another primary object of the present invention, in addition to the foregoing objects, to provide improved kites capable of hovering above the operator's head as well as flying at an angle to him.

It is yet another primary object of the present invention, in addition to each of the foregoing objects, to provide kites adapted for flights of unusual height and duration.

Yet still another primary object of the present invention, in addition to each of the foregoing objects, is to provide kites which are so constructed and arranged as to preclude nose-diving or plunging downward, enabling the kites to be more easily launched and maintained in smooth flight.

A yet still further primary object of the present invention, in addition to each of the foregoing objects, is to provide kites which combine lightness with great lifting power.

Another and yet still further primary object of the present invention, in addition to each of the foregoing objects, is to provide kites of simple construction which can be readily folded or disassembled and assembled.

It is yet a further primary object of the present invention, in addition to each of the foregoing objects, to provide improved kites fabricated of flexible panels and removable struts enabling simple and easy replacement of broken struts and further enabling a slight give between

the panels and the struts under stress to reduce the possibility of tearing of the panels.

It is yet another primary object of the present invention, in addition to each of the foregoing objects, is to provide improved kites constructed and arranged to automatically compensate for changes in wind velocity and direction.

Another and yet still further object of the present invention, in addition to each of the foregoing objects, is to provide improved kites constructed and arranged to enable simple adjustments to be made through the configuration thereof to retain the stability of the kite under changing wind conditions and after prolonged use.

A further primary object of the present invention, in addition to each of the foregoing objects, is to provide improved kites fabricated to enable elaborate decoration thereof in a variety of ways without adversely affecting the performance thereof.

The invention resides in the combination, construction, arrangement and disposition of the various component parts and elements incorporated in improved kites constructed in accordance with the principles of this invention. The present invention will be better understood and objects and important features other than those specifically enumerated above will become apparent when consideration is given to the following details and description, which when taken in conjunction with the annexed drawing describes, discloses, shows and illustrates a preferred embodiment of the present invention and what is presently considered and believed to be the best mode of practicing the principles thereof. Other embodiments or modifications may be suggested to those having the benefit of the teachings herein, and such other embodiments or modifications are intended to be reserved especially as they fall within the scope and spirit of the subjoined claims.

In the drawing:

FIG. 1 is a top plan view of an improved kite constructed in accordance with the principles of the present invention;

FIG. 2 is a cross sectional elevational view along line 2—2 of FIG. 1;

FIG. 3 is an illustrative showing of the improved kite of the preceding figures showing the configuration thereof during flight;

FIG. 4 is a top plan view similar to FIG. 1 showing another improved kite configured to represent a bird constructed in accordance with the present invention;

FIG. 5 is a top plan view of yet another improved kite configured to represent a bat constructed in accordance with the principles of the present invention;

FIG. 6 is a top plan view of still another improved kite configured to represent an aircraft constructed in accordance with the principles of the present invention;

FIG. 7 is an enlarged partial illustration of one strut connection according to the present invention;

FIG. 8 is an enlarged partial illustration of another strut connection made in accordance with the present invention;

FIG. 9 is an enlarged illustration of yet another strut connection in accordance with the present invention;

FIG. 10 is an enlarged illustration of a still further strut connection made in accordance with the present invention.

With reference now to FIGS. 1 and 2 of the drawing, there is shown and illustrated an improved kite constructed in accordance with the principles of the present invention and designated generally by the reference character **20**.

The kite **20** comprises a main body portion **22** fabricated of a generally polygonal sheet of thin, flexible material and a keel portion **24** likewise fabricated of a generally polygonal sheet of thin, flexible material.

While the main body portion 22 and the keel portion 24 may be fabricated of any suitable thin, flexible material, it has been found preferable to fabricate the main body portion 22 and the keel portion 24 of woven cloth, synthetic or other suitable material which has a slight give and which does not tear easily resulting in an inexpensive and highly durable kite, further enabling the required seams to be easily and readily provided in any conventional manner, as by stitching, adhesive bonding, or the like. Furthermore, the use of a fabric allows the kite to be elaborately decorated in a variety of ways without marring the performance of the kite. While it has been found that the use of a slightly porous cloth in the construction of the improved kite 20 appears to aid in providing superior flight characteristics and performance thereof, it is to be understood that non-porous materials might also be utilized without departing from the present invention. In the ensuing description, and in the claims, the material from which the main body portion 22 and the keel portion 24 are fabricated may be referred to merely by the terminology fabric, but such terminology is not to be deemed limiting but rather is to be interpreted in its broadest sense, the terminology being utilized merely to aid in an understanding of the present invention.

Accordingly, the main body portion 22 comprises a sheet of fabric 26 and the keel portion 24 comprises a sheet of fabric 28. A center strut 30 is structurally associated with the sheet of fabric 26 substantially centrally thereof such as to subdivide the sheet of fabric 26 into two mirror image wing sections 32 and 34. The wing sections 32 and 34 preferably are of generally right triangular configuration, the opposite side edge portions 36 and 38, respectively, lying along the corresponding hypotenuse of the wing sections 32 and 34. A wing strut 40 and a wing strut 42 are provided structurally associated with each of the opposite side edge portions 36 and 38. A cross strut 44 is also provided extending generally perpendicular to the center strut 30 and extending substantially between the wing struts 40 and 42.

While the struts 30, 40, 42 and 44 may be structurally associated with the sheet of fabric 26 in any desired manner, as by gluing or the like, the struts 30, 40, 42 and 44 are preferably removably structurally associated with the sheet of fabric 26 to enable ready assembly, disassembly, replacement, adjustment and folding. Accordingly, the center strut 30 and the wing struts 40 and 42 preferably are housed in sleeves 46, 48 and 50, respectively, formed from the sheet of fabric 26 to protect the struts and produce a solid wing construction without vulnerable additions. Also, the center struts 30 and the wing struts 40 and 42 preferably are not permanently attached along the entire length thereof to the sleeves 46, 48 and 50 but rather, limited relative movement therebetween is permitted to enable the sheet of fabric 26 to automatically adjust against the strut surfaces to the maximum tension of the sheet of fabric 26 with changes in wind velocity and direction during flight. The sheet of fabric 28, which forms the keel portion 24 is secured to the center strut housing or sleeve 46, as by stitching 52, or the like, so that the sheets of fabric 26 and 28 become effectively one unit, enabling immediate response therebetween during flight to changes in wind velocity and direction.

The main body portion 22 of the kite 20 is accordingly of generally triangular or delta configuration, having leading edges 54 and 56 defined by the sleeves 48 and 50 extending generally rearwardly and outwardly of an apex 58. The wing struts 40 and 42 are of lesser longitudinal extent than the leading edges 54 and 56 and extend from locations 60 and 62 generally rearwardly of the apex 58 to locations 64 and 66 adjacent the rearward apices of the main body portion 22. Accordingly, the region of the main body portion adjacent the forward apex 58 is of decreased weight precluding top-heaviness, a frequent cause of launch and flight difficulty, and presenting a better airfoil.

Under differing wind conditions, and after prolonged use resulting in permanent stretching or other structural changes, a kite's stability may be impaired, and it will often falter in flight or veer to one side or the other. The improved kite 20 is therefore so constructed and arranged as to enable simple adjustments to be made to retain the stability of the kite under such changing wind conditions and after prolonged use. A plurality of attachment locations 68 may be provided on the keel portion 24 to enable a string or the like to be attached to the keel portion 24 in varying relationship to the lower keel point 70. Additionally, a portion 72 of the upper peripheral edge 74 of the sheet of fabric 28 adjacent the rear 76 thereof may be unsecured with the sheet of fabric 28 and the sleeve 46 may be terminated at a location 78 spaced from the rear edge 80 of the sheet of fabric 26 to enable the rear end portion 82 of the strut 30 and the rear portion 76 of the sheet of fabric 28 to be selectively positioned relative to the sheet of fabric 26. For example, the location 78 may be spaced from the rear edge 80 and the length of the portion 72 of the upper peripheral edge 74 of the sheet of fabric 28 may be of a length of approximately one quarter the distance between the apex 58 and the rear edge 80 and a plurality of attachment locations 84 are provided adjacent the rear edge 80 of the sheet of fabric 26 to enable the rear portion 82 of the center strut 30 and the rear portion 76 of the sheet of fabric 28 to be attached to the sheet of fabric 26 directly centrally, or slightly to the left or slightly to the right of the center to enable the keel portion 24 and the center strut 30 to provide the effect of a movable rudder. The rear portion 82 of the center strut 30 and the rear portion 76 of the sheet of fabric 28 may be secured with the attachment locations 84 in a convenient manner, as by means of a tie.

Additionally, the cross strut 44 may be so constructed and arranged as to be movable slightly forward or back of the normal position which is approximately slightly forwardly of the center of the main body portion 22, as indicated by the phantom lines in FIG. 1. Preferably, provision is made for at least one of the above mentioned adjustments, that is the keel and center strut adjustment or the cross strut adjustment, but not necessarily for both. While the provision of both types of adjustment do not appear to be necessary, the provision of one or the other type of adjustment does help flight considerably. The adjustable rudder effect which is achieved by the adjustable keel portion and center strut appears to help the most but the adjustable cross strut may be accomplished more easily. Both adjustments, may however be provided. Each of the above adjustments are simply made, but if the operator does not choose to make the adjustments, the kite will still fly well but the stability and useful life thereof can be prolonged by provision of at least one of the above-mentioned adjustments.

As hereinbefore pointed out, the sheet of fabric 26 is generally of triangular or delta configuration and preferably is a unitary sheet of material. The sheet of fabric 26 preferably is cut to the desired configuration prior to construction to enable simple construction of the sleeves or housings 46, 48 and 50. The struts 30, 40, 42 and 44 are fabricated of wood or other appropriate light-weight relatively inflexible material. If, for example, the kite 20 has a wing spread of approximately six feet across the rear edge 80 thereof then the struts 30, 40 and 42 may be fabricated of quarter inch dowels and the cross strut 44 may be fabricated of a quarter or five sixteenth dowel. If the wing spread is greater or less, the diameter of the cross strut, center strut and wing struts would be changed proportionately. As also hereinbefore pointed out, the wing struts are of lesser longitudinal extent than the leading edges 54 and 56 and preferably are of approximately three quarters the length of the leading edges 54 and 56. The center strut 30 is substantially equal to the vertical center length of the kite 20, that is, the perpen-

dicular distance between the apex 58 and the rear edge 80. The cross strut 44 is of an appropriate length to extend substantially across the piece of fabric 26 at the location of securement thereto, which as previously pointed out is generally slightly forwardly of the midpoint and preferably is approximately one-third the distance from the apex 58 to the rear edge 80, or one-third the length of the leading edge 54 or 56.

The wing strut sleeves or housings 48 and 50 are constructed by folding inwardly each leading edge 54 and 56 of the sheet of fabric 26 and securing the folded edge to the upper kite surface forming a fold or sleeve wide enough to accommodate the wing struts 40 and 42 therewithin when the edges are secured. The edges may be secured in any convenient manner, as by stitching along a sewn seam, by using a heat-adhesive tape, a pressure sensitive adhesive tape, an adhesive, or a combination of these methods. The sleeves 48 and 50 may extend substantially entirely along the leading edges 54 and 56 or may terminate at a location rearwardly of the apex 58, such as at a location approximately one quarter the length of the leading edges 54 and 56 from the apex 58. The rear of the sleeves 48 and 50 are closed adjacent the rear apices 64 and 66 in any desired manner. Provision may be made for inserting the wing struts 40 and 42 into the sleeves 48 and 50 by leaving the front end of the sleeves 48 and 50 open or by closing the front ends of the sleeves 48 and 50 and making a slit or aperture 86 in each of the sleeves or housings 48 and 50 at, or forwardly of the locations 60 and 62. The slits or apertures 86 should, obviously, be sufficiently large and, preferably are formed in the upper surface of the sleeves 48 and 50, to enable the wing struts 40 and 42 to be inserted therein.

The wing struts 40 and 42 preferably are secured with the sleeves 48 and 50 only adjacent the locations 60 and 62, as by drilling or otherwise forming a hole or aperture within the sleeves 48 and 50 and therethrough and through the struts 40 and 42 to enable a cord or other appropriate fastener to pass through the apertures to secure the struts with the sleeves. Preferably, the apertures in the sleeves 48 and 50 are reinforced with grommets, adhesive tape, glue or other appropriate materials to preclude tearing of the sheet of fabric 26. If the wing struts 40 or 42 are damaged, the fastening may be readily removed enabling the strut to be readily replaced and resecured.

The center strut sleeve or housing 46 may be constructed by sewing a seam 88 parallel to the vertical center of the sheet of fabric 26 joining the sheet of fabric 26 together so that the sleeve or housing 46 will appear on the undersurface of the kite 20. The seam is formed sufficiently far from the vertical center of the sheet of fabric 26 so that the sleeve or housing 46 will be of sufficient size to enable the center strut 30 to be accommodated therein after the keel portion 24 is attached, as will be described in more detail hereinafter. If the movable rudder effect adjustment is not to be utilized, the seam 88 will extend substantially entirely between the apex 58 and the rear edge 80 of the sheet of fabric 26 and the sleeve or housing 46 will be closed adjacent the rear edge 80. Provision may be made for the removal and insertion of the center strut 30 in a manner similar to the securement, removal and replacement means provided for the wing struts 40. Such provision would be made adjacent the apex 58.

If the movable rudder effect adjustment is to be provided, then the seam 88 will extend from the apex 58 to a point approximately one quarter the distance between the apex and the rear edge 80 from the rear edge 80 so that the sleeve or housing 46 will extend substantially three quarters of the length from the apex 58 to the rear edge 80. The sleeve or housing 46 would accordingly be closed at the apex 58 and left open at the location 78, as shown. In any case, provision is made at the apex 58 to removably secure the center strut 30 to the sheet of fabric 26 thereat, in a similar manner to the securement of the wing struts 40 and 42.

The securing locations may be provided, as by providing a plurality of apertures adjacent the rear edge 80, the apertures 84 being reinforced as by grommets, adhesive tape, or the like, either alone or in combination enabling a cord 90, or the like to be utilized to releasably secure the center strut 30 therewith.

The sheet of fabric 28 forming the keel portion 24 is likewise generally triangular in shape. The sheet of fabric 28 preferably is sewn directly to the lower edge of the center strut sleeve 46 and the keel portion 24 preferably is approximately three quarters the length of the center strut on the upper edge 74 thereof. The lower keel point 70 is preferably located substantially perpendicular to the location 92 whereat the cross strut 44 and the center strut 30 intersect.

If the movable rudder adjustment is not provided, the keel portion 24 is sewn, or otherwise secured, with the lower edge of the center strut sleeve along the seam line 52 from the rear of the sleeve 46, that is from adjacent the rear edge 80 for the full length of the upper edge 74 of the piece of fabric 28, ending forwardly approximately three quarters of the distance from the rear edge 80 to the apex 58. If the movable rudder adjustment is to be used, then the piece of fabric 28 is sewn, or otherwise structurally associated with the lower edge of the center strut sleeve 46 from a point approximately one quarter of the distance from the rear edge 80 to the apex 58, that is, substantially at the location 78 to the end of the upper edge 74. Since the forward edge end of the piece of fabric 28 ends approximately a quarter of the distance from the apex 58 to the rear edge 80 the piece of fabric 28 is secured with the piece of fabric 26 for approximately half the distance between the apex 58 and the rear edge 80, such length corresponding to approximately two-thirds of the length of the upper edge 74 of the piece of fabric 28. Furthermore, the portion 72 of the upper edge 74 of the piece of fabric 28 extends without permanent fastening beyond the location 78 to generally adjacent the rear edge 80.

As hereinbefore mentioned, the attachment locations 84 are preferably reinforced with grommets, adhesive tape, glue or other appropriate reinforcement. Preferably, the openings 84 are spaced approximately one quarter to one half inch apart and are so configured as to enable variations in the amount of tension placed upon the center strut 30 and the keel portion 24 since the kite 20 will operate more stably if the amount of keel surface under tension is decreased as the wind velocity increases.

The raw fabric edges of the sheet of fabric 28 and the sheet of fabric 26 preferably are reinforced, as by hems, adhesive tapes, or the like. The cross strut 44 extends across the upper surface of the main body portion 22 approximately one-third of the way from the apex 58 to the rear edge 80, or slightly forwardly of the medial location therebetween, as hereinbefore stated and is secured with the main body portion 22 by cross strut fastening means 94 to be described in more detail hereinafter. Preferably, as also hereinbefore pointed out, the cross strut 44 is removably secured by the cross strut fastening means 94 and the cross strut fastening means 94 may be so constituted and arranged as to enable the position of the cross strut 44 to be varied. Strips of adhesive tape 96 and 98 may be provided adjacent the adjustable fastening locations 84 and 68, respectively, to reinforce the sheets of fabric 26 and 28. The multiple attachment points 68 on the keel portion 24 enable the amount of keel surface under tension to be varied, since it is desirable that the amount of keel surface under tension be decreased as the wind velocity in which the kite is flying increases.

Various modifications may be made in the shape of the main body portion 22 of the kite 20 without departing from the scope of the present invention. Accord-

ingly, and with reference now to FIGS. 4, 5 and 6 there are shown and illustrated variously configured kite modifications constructed in accordance with the present invention. Such configurations as are shown in FIGS. 4, 5 and 6 are by way of example only, and it is to be understood that kites may be constructed in accordance with the present invention while taking various forms and arrangements without departing from the spirit of the invention. In each of FIGS. 4, 5 and 6, similar reference characters will be utilized for like parts as were utilized in FIGS. 1 and 2, except that the kite of FIG. 4 is designated generally by the reference character **120**, the kite shown and illustrated in FIG. 5 is generally designated by the reference character **220** and the kite shown and illustrated in FIG. 6 is designated by the reference character **320**. A similar numbering system is used for the other reference characters.

Accordingly, and with reference now to FIG. 4 of the drawing there is shown and illustrated a modified kite **120** configured, constructed and arranged to the shape of a bird. The main body portion **122** of the kite **120** is fabricated of a sheet of fabric **126**. A center strut **130** subdivides the sheet of fabric **126** into a pair of mirror image wing sections **132** and **134** having opposite side edges **136** and **138**, respectively. Side struts **140** and **142** are structurally associated with the wing sections **132** and **134** adjacent the side edges **136** and **138** thereof. A cross strut **144** extends across the upper surface of the sheet of fabric **126** between locations adjacent the opposite side edges **136** and **138**. The center strut **130** is retained within a center sleeve **146** formed by sewing and securing the sheet of fabric **126** together and the wing struts **140** and **142** are also secured with the sheet of fabric **126** within sleeves **148** and **150** formed thereon.

The sheet of fabric **126** is configured between the apex **158** thereof and the outwardly and rearwardly extending wing struts **140** and **142** to generally concave configuration, as shown. Such modified configuration is easily effectuated, since, as hereinbefore pointed out, the opposite side edges **136** and **138** adjacent to and immediately anteriorly of the front apex **158** are not reinforced by the struts **140** and **142**.

The rear edge **180** of the sheet of fabric **126**, rather than being substantially straight as is the rear edge **80** of generally curvilinear configuration. Accordingly, the rear edge **180** comprises rear wing edges **102** and **104** and a rear tail edge **106**. Tail side edges **108** and **110** extend generally rearwardly and outwardly from the rear wing edges **102** and **104** to the rear tail edge **106** to define therebetween a tail section **110**. The center strut **130** is extended to greater longitudinal extent so as to extend substantially between the front apex **158** and the rear tail edge **106**. Each of the side tail edges **108** and **110** is folded inwardly to define sleeves or housings **112** and **114** for receiving therewithin tail edge struts **116** and **118**. A rear cross strut **121** is also provided as shown. Each of the tail struts **116** and **118** is retained forwardly of the rear edge **180** by means, such as pockets **123** and **125** secured with the sheet of fabric **126** as by means of sewing, an adhesive, or the like. The center strut sleeve **146** terminates at a location **178** spaced from the rear tail end **106** and the center strut **130** is adjustably connected with the sheet of fabric **126** adjacent the rear tail edge **106** by means of adjustable locating means **184**.

With reference now to FIG. 5, the basic improved kite **20** may be modified to the configuration of a kite **220** representative of a bat, or the like. The bat kite **220** comprises a main body portion **222** and a keel portion such as the keel portion **24** shown in FIG. 2. The main body portion **222** comprises a sheet of fabric **226** and a center strut **230** subdividing the sheet of fabric **226** into two mirror image wing sections **232** and **234** having opposite side edges **236** and **238**, respectively. Wing struts **240** and **242** are structurally associated with the sheet of fabric **226** adjacent the opposite side edge portions **236** and **238** and a cross strut **244** extends therebetween. The center strut **230** is contained within a sleeve or housing **246** and the wing struts **240** and **242** are contained within sleeves or housings **248** and **250**, respectively. The leading edges **254** and **256** adjacent the front apex **258** are of substantially convex configuration to define the front of a bat's head. The rear edge **280** of the sheet of fabric **226** is configured as shown to define the rear wing edges and tail of a bat. Panels of material **202** and **204** of colors contrasting to the color of the sheet of fabric **226** or transparent sheets of material are positioned adjacent the apex **258** generally forwardly of the wing struts **240** and **242** to define the front edges **206** and **208** of the bat's wings and the side edges **210** and **212** of the bat's head. The juncture between the side edges **210** and **212** with the portion of the leading edges **254** and **256** adjacent the apex **258** define the ears **214** and **216** of the bat. Crossed struts **218** and **221** extend generally rearwardly from the ears **214** and **216** to locations **223** and **225** on the rear edge **280** of the sheet of fabric **226** to support the ears **214** and **216**. The crossed struts **218** and **221** may be secured with the sheet of fabric **226** by means of pockets, or the like secured with the sheet of fabric **226** at the ears **214** and **216** and at the locations **223** and **225**.

With reference now to FIG. 6 of the drawing, there is shown and illustrated a modified form of kite **320** configured to represent an airplane. The kite **320** comprises a main body portion **322** and a keel portion such as the keel portion **24** shown in FIG. 2 secured generally longitudinally centrally thereto.

The main body portion **322** is provided with a center strut **330** to subdivide the main body portion **322** into two mirror image wing sections **332** and **334**, the opposite side edges **336** and **338** thereof being provided with wing struts **340** and **342**, respectively which are disposed in generally convergent relationship at opposite sides of the center strut **330** and a cross strut **344** extends therebetween generally perpendicular to the center strut **330**.

The center strut **330** is housed and retained within a sleeve or housing **346** to which the keel portion is secured and the wing struts **340** and **342** are housed in sleeves or housings **348** and **350** formed along the opposite side edges **336** and **338**, respectively, to define thereby leading edges **354** and **356** diverging generally outwardly and rearwardly from the front apex **358**. The front apex **358** is of generally convex configuration with the portions of the leading edges **348** and **450** adjacent thereto being configured to generally concave curvilinear edges to thereby produce the effect of a nose portion of an airplane. The center strut **330**, cross strut **334** and wing struts **340** and **342** are, as in the previously described embodiments, preferably removably and movably associated with the sheet of fabric **326** defining the main body portion **322**.

The rear edge **380** of the sheet of fabric **326** is provided with a generally central extension or tail **302** of generally triangular configuration which is provided with a pair of tail edge struts **304** and **306** retained within housings or sleeves **308** and **310**, respectively and with a tail cross strut **312** extending therebetween. The struts **304**, **306** and **312** are preferably removably associated with the sheet of fabric **326** in a manner similar to the removable securement of the main cross strut **344** and th main wing struts **340** and **342**. The tail edge struts **304** and **306** may be retained against forward movement within the housings or sleeves **308** and **310** by means of pockets **314** and **316** secured with the sheet of fabric **326** in any convenient manner, as by stitching, adhesive bonding or the like.

As hereinbefore pointed out, the cross struts **44**, **144**, **244** and **344** are preferably removably and movably positioned and secured with the respective main body por-

tions 22, 122, 222 and 322. Accordingly, and with reference now to FIGS. 7, 8 and 9 of the drawing, there are shown and illustrated several embodiments or modifications of fastening means which may be utilized to effectuate such securement. With particular reference now to FIG. 7, the wing sleeve 50 for the wing strut 42 may be provided with a plurality of grommets or other reinforcements 402 to enable the cross strut 44 to be secured therewith as by means of a string, cord, or the like 404 passing through the grommets 402 and through an aperture 406 provided adjacent the end portion of the cross strut 44. In the ensuing description and in FIGS. 7, 8 and 9 of the drawing, the various embodiments or modifications of the attachment means for the cross struts will be illustrated and described as pertaining to the kite 20, but it is to be understood that the various embodiments or modifications of the attachment means may be also utilized with any of the kites 20, 120, 220 and 320.

With more particular reference now to FIG. 8, the cross strut 44 may be retained in a selected one of a plurality of pockets 408 structurally associated with the sheet of fabric 26 adjacent the sleeve 50. The pockets 408 may be fabricated of any convenient material, and may be secured with the sheet of fabric 26 as by stitching, adhesive bonding, stapling, or the like.

With reference now more particularly to FIG. 9, the cross strut 44 may be secured within one of a plurality of lengths of relatively flexible tubing 410. The tubing 410 may comprise rubber, plastic or other appropriate material and may be secured to the sheet of fabric 26 adjacent the sleeve 50 and on the underside thereof as by means of a staple 412, or the like so that the piece of tubing 410 extends generally transversely outwardly of the sheet of fabric 26 enabling the outer end portion 414 of the piece of tubing 410 to be bent upwardly and over the housing 50 and wing strut 42 contained therewithin so that the end portion 414 will extend generally laterally inwardly to enable the end portion of the cross strut 44 to be inserted easily therewithin during operation. The piece of tubing 410 preferably has sufficient resiliency to enable the end portion 414 thereof to securely grip the end portion of the cross strut 44 during flight.

With reference now to FIG. 10 of the drawing, it was previously pointed out that the center strut 30 and the rear end portion 72 of the sheet of fabric 28 defining the keel portion 24 are preferably movably positioned and secured with the rear edge 80 of the sheet of fabric 26 defining the main body portion 22. As can be readily seen in FIG. 10 grommets 84 may be provided in spaced relationship along and adjacent the rear edge 80 to enable a cord, string, or the like 416 to be passed therethrough and through an aperture 418 provided adjacent the rear end portion of the center strut 30. The sheet of fabric 26, adjacent the grommets 84 may be reinforced, as by means of adhesive tape, or the like 420 secured therewith enabling the center strut 30 and the rear end portion 72 of the keel portion 24 to be movably and removably secured. Accordingly, should the kite begin to fly veered in one direction or the other, the operator may release the cord or string 416 and refasten the center strut 30 and the rear end 72 of the keel portion 24 to one side or the other of the center of the rear edge 80 to correct such veering.

Any of the kites 20, 120, 220 and 320 may be decorated with designs by painting, printing or in any other way color is commonly applied to a fabric. The various kites may be constructed of more than one color and kind of fabric by adhering multiple pieces of fabric together with heat sensitive adhesive tape, pressure sensitive adhesive tape, glue, stitching, or any other material or method capable of making a strong and permanent bond between two pieces of fabric. Designs may be provided on any of the kites by means of appliques, or the like comprising a piece of fabric of any desired shape sewn to the surface of the kite or by cutting a portion out of the sheet of fabric comprising the kite and replacing the cutout portion with a piece of fabric of another color or type or a transparent fabric. In each case, however, it has been found preferable to utilize an adhesive, rather than a sewn seam for decorative purposes as the use of an adhesive will preclude unwanted air leaks between the kite surfaces.

During flight, the main body panels of each of the kites 20, 120, 220 and 320 assume the shape of an airfoil in a conventional manner, as shown in FIG. 3 of the drawing. The absence of wing struts in the forward portion of the leading edges aid in enabling the main body panels to assume a more efficient airfoil configuration than conventional prior tailless kites and furthermore reduces the weight of the forward end portions of the kites which additionally improves the flight characteristics thereof, and furthermore enables the fabric adjacent the front apex to be configured to any desired contour. The absence of struts adjacent the rear edge portion of the kite enables the rear edge to also be configured to any desired contour and provided with reinforcing struts as may be necessary or desirable.

It is to be understood that terminology such as "forwardly" and "rearwardly" along with other similar directional terminology, is to be construed and interpreted in its normal and accepted sense, and is not to be construed or interpreted in a limiting sense either in the foregoing description or the subjoined claims, since the same is used merely to facilitate an understanding of, and to clearly set forth and particularly define the present invention.

While the invention has been shown, illustrated, described and disclosed in terms of embodiments or modifications which it has assumed in practice, the scope of the invention should not be deemed to be limited by the precise embodiments or modifications herein shown, illustrated, described and disclosed, such other embodiments or modifications as may be suggested to those having the benefit of the teachings herein being intended to be reserved especially as they fall within the scope and spirit of the claims here appended.

What is claimed is:

1. Kite comprising, in combination, a main body portion fabricated of flexible material having leading edges diverging generally rearwardly from a forward apex portion, reinforcing means structurally associated with said main body portion adjacent said leading edges and extending generally rearwardly at least from locations along said leading edges spaced apart from said apex portion, and a keel portion depending from and structurally associated with said main body portion along a location substantially bisecting the angle between said leading edges, a portion of the upper edge of said keel portion being free to move relative to said main body portion and adapted to be adjustably positioned relative thereto.

2. Kite defined in claim 1 further comprising center strut sleeve means structurally associated with said main body portion extending generally centrally of said leading edges and terminating forwardly of the rear of said main body portion, center strut means extending longitudinally of said center strut sleeve means and associated therewith at least at a location adjacent said apex portion, and means for securing the rear end portion of said center strut means at selected locations adjacent the rear of said main body portion.

3. Kite defined in claim 2 further comprising cross strut means extending generally transversely between said leading edges and means for selectively securing said cross strut means in a plurality of positions relative to said main body portion.

4. Kite defined in claim 3 further comprising wing strut sleeve means extending generally adjacent said leading edges, said reinforcing means comprising wing strut means extending within said wing strut sleeve means, said wing strut means being secured with said main body portion

at only one location adjacent each leading edge and adapted for movement relative to said wing strut sleeve means at other than such location.

5. Kite defined in claim **4** wherein said keel portion is of generally triangular configuration and is provided with a plurality of attachment locations adjacent the lowermost apex thereof for enabling a cord, string, wire or the like to be attached thereto.

6. Kite defined in claim **1** further comprising wing strut sleeve means extending generally adjacent said leading edges, said reinforcing means comprising wing strut means extending within said wing strut sleeve means, said wing strut means being secured with said main body portion at only one location adjacent each leading edge and adapted for movement relative to said wing strut sleeve means at other than such locations.

7. Kite defined in claim **1** wherein said keel portion is of generally triangular configuration and is provided with a plurality of attachment locations adjacent the lowermost apex thereof for enabling a cord, string, wire or the like to be attached thereto.

8. Kite defined in claim **1** further comprising cross strut means extending generally transversely between said leading edges, and means for selectively securing said cross strut means in a plurality of positions relative to said main body portion.

9. Kite defined in claim **8** wherein said keel portion is of generally triangular configuration and is provided with a plurality of attachment locations adjacent the lowermost apex thereof for enabling a cord, string, wire or the like to be attached thereto.

10. Kite comprising, in combination, a main body portion fabricated of flexible material having leading edges diverging generally rearwardly from a forward apex portion and provided with center strut sleeve means extending generally centrally of said leading edges and terminating forwardly of the rear of said main body portion, a keel portion depending from said main body portion generally centrally of said leading edges, reinforcing means structurally associated with said main body portion adjacent said leading edges, center strut means extending longitudinally of said center strut sleeve means and associated therewith at least at a location adjacent said apex portion, and means for securing the rear end portion of

said center strut means at selected locations adjacent the rear of said main body portion.

11. Kite defined in claim **10** further comprising wing strut sleeve means extending generally adjacent said leading edges, said reinforcing means comprising wing strut means extending within said wing strut sleeve means, said wing strut means being secured with said main body portion at only a single location adjacent each leading edge and adapted for movement relative to said wing strut sleeve means at other than such locations.

12. Kite comprising, in combination, a main body portion fabricated of flexible material having leading edges diverging generally rearwardly from a forward apex portion, a keel portion depending from said main body portion generally centrally of said leading edges and reinforcing means structurally associated with said main body portion adjacent said leading edges, cross strut means extending generally transversely between said leading edges, and means for selectively securing said cross strut means in a plurality of positions relative to said main body portion.

13. Kite defined in claim **10** further comprising cross strut means extending generally transversely between said leading edges and means for selectively securing said cross strut means in a plurality of positions relative to said main body portion.

References Cited

UNITED STATES PATENTS

D. 196,057	8/1963	Levine.	
713,381	11/1902	Battersby	244—153
743,301	11/1903	Lischtiak	244—153
919,436	4/1909	Jackson	244—153
984,295	2/1911	Peuvot	244—154
1,892,985	1/1933	Hughes	244—153
2,785,870	3/1957	Green	244—153
3,018,075	1/1963	Bowers	244—153
3,248,075	4/1966	Cunningham	244—153

FOREIGN PATENTS

481,617	3/1938	Great Britain.

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